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ABSTRACT

Presented is a collection of very brief chapters (or sections) drawn from a variety of sources which discuss the characteristics of the disadvantaged learner. In addition, suggestions for teaching mathematics to the disadvantaged using a laboratory approach are made. Conclusions include a description of the attributes necessary to be an effective teacher of the disadvantaged. Also included is a short description of a teacher training program, a preschool education program, and a support program being used in the Appalachian region. (MK)

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IMPLICATIONS for MATH LEARNING

and

THE DISADVANTAGED CHILD

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PREFACE

The research for this paper deals with the implications for math learning resulting from the writer's participation in a field study in Math Content and Method conducted at two elementary schools in the Appalachia Region of southwestern Pennsylvania under the direction of the Elementary Education Department and the Division of Graduate Studies, California State College, California, Pennsylvania.

The areas of intellectual performance which show the least difference in level of performance are those associated with mathematical reasoning. Factor analysis of intelligence test performance, on the other hand, indicates that the types of reasoning processes (as distinct from levels of performance) employed by both middle-class and lower-class children are the same.¹

Therefore, since this study deals specifically with math learning, it was not deemed necessary to set up control groups (A) "advantaged" and (B) "disadvantaged" because the children in the two schools involved represent a cross section of a typical classroom found in the immediate area.

However, a relevant comparison was noted between School (1) which had been exposed to the theoretical/psychological math processes discussed in this paper over a three year period and School (2) which had not. School (1) scored significantly higher on the Peabody Individual Achievement Test (Subtest, 1, Mathematics) and the Keymath Diagnostic Profile than School (2).²

¹Harry Beilin, Lassar G. Gotkin, "Psychological Issues in the Development of Mathematics Curricula for Socially Disadvantaged Children, "Education of the Disadvantaged, ed., A. Harry Passow, (New York: Holt, Rinehart and Winston, Inc., 1967), p. 315.

²Peabody Individual Achievement Test - Keymath Diagnostic Profile, American Guidance Service, Inc., (Minnesota, 1970).

CHAPTER I
INTRODUCTION

If the disadvantaged child is to be liberated from his restricted social and intellectual environment and placed in the mainstream of life, many new and varied stimulaitons must be provided to him...

William H. Graves, Ed.D.

CHAPTER I

For discussion purposes the "disadvantaged" means any child (or person) whose resources are limited to any major aspect of the current American culture be it educational deprivation, social deprivation, economic deprivation or a combination of these. In fact, any child for whom the school curriculum is inadequate or irrelevant can be included in this category.

The assessed intellectual performance of disadvantaged children is likely to be at least ten to fifteen IQ points lower, on the average, than that of other children, and scholastic achievement is likely to be retarded in all areas of academic learning.

The school is in the best position to take the lead in the "counter-deprivation" evolution by virtue of its compulsory nature and its generous time allotment in the child's day.

Professional teachers, devoted to the cause of equal educational opportunity for all will begin this effort by recognizing the characteristics of the disadvantaged and proceeding then to reorganize their teaching approaches to meet this ever growing need.¹

¹William H. Graves, Ed.D., Into the Mainstream, (Texas: Texas A&M University Press, 1967, p. 2.

CHAPTER II

CHARACTERISTICS OF THE DISADVANTAGED

The school has the function also of coordinating within the disposition of each individual the diverse influences of the various social environments in which he enters. One code prevails in the family; another, on the street, a third in the workshop or store; a fourth, in the religion association. As a person passes from one of the environments to another he is subjected to antagonistic pulls, and is in danger of being split into a being having different standards of judgment and emotion for different occasions. This danger imposes upon the school a steadying and integrating office.

...John Dewey

CHAPTER II

CHARACTERISTICS OF THE DISADVANTAGED

According to their cultural and economic status, our citizenry can be classified roughly as privileged, average (often referred to as middle-class), and disadvantaged.¹

The designation of "disadvantaged" should not be equated with membership in any ethnic group, but should be defined in terms of characteristics of the individual and/or his environment.

The child whom we designate as "disadvantaged" differs from the "advantaged" in language development, self-concept, and social skills, as well as in attitude toward schooling and society. He has fewer interests than the middle-class child. His form of communication, unlike that of other children entering school, tends to consist mostly of gestures, sounds (nonwords), and local words. Just as he has inadequate linguistic skills of expression, so has he inadequate receptive skills. He does not hear sounds as we pronounce them. He tends to "close out" many noises around him (including the teacher's voice). When he does hear us, our words do not necessarily mean to him what they mean to us. He devalues himself. He comes into school feeling that accomplishment and success are impossible for him. If, in class, he finds himself among children from the dominant culture, his feeling of being different is reinforced - their ways are "acceptable"; his are not.²

¹Lester D. Crow, Walter I. Murray, Hugh H. Smythe, Educating the Culturally Disadvantaged Child, (New York: David McKay Company, Inc., 1966), p.1.

²Joseph O. Loretan, Shelly Umans, Teaching the Disadvantaged (New York: Columbia University Teachers College Press, 1966), p.4.

Home Environment: The disadvantaged child lives in substandard housing. Often he is forced to live in an overcrowded household. Sometimes one parent - usually the mother - has full responsibility for holding this home together. In some cases, two or more families may share the same home, and other relatives may also be included in the family structure. It is not unusual to find adults and children sharing the same bedroom. In some cases, both parents are present in the home during the daytime hours, but are away working in the evening. Too often these children are inadequately supervised and may stay up watching television until the early hours of the morning. Naturally many come to school exhausted. These children are not in a frame of mind or in physical condition to do school tasks.¹

The poverty stricken home he lives in may be under the shade of a large oak tree, but he does not know what kind of tree it is, or what kinds of birds make their home in it. Although a beautiful well-stocked zoo may be within his home radius, animals from other parts of the world and from various sections of his own country remain a mystery to him.

It is little wonder that the vocabulary used by the teacher and the words in books are often no more than meaningless symbols, even when English is the language spoken at home.²

He has experienced no logical pattern in life; things just happen. He lives now, not in the future. He has had little or no experience in setting and proceeding toward goals and in evaluating or reviewing past actions as to whether or not they were "worth it". When the disadvantaged youngster acts,

¹Sidney W. Tiedt, Teaching the Disadvantaged Child, (New York: Oxford University Press, 1968), p. 8.

²Ibid., p. 9.

it is usually in response to an immediate stimulus; there is little room in his scheme for second thoughts, meditation or planning.

Motivation: Children from disadvantaged homes are not motivated to learn. Intrinsic motivation (cognitive drive) is acquiring knowledge as an end in itself. The disadvantaged possess little intrinsic motivation. Frequently, the best way to motivate a non-motivated learner is to ignore, for the time being, his motivational state and concentrate on teaching him as effectively as possible. He will learn despite lack of motivation. From the satisfaction of learning he will develop the motivation to learn more. Success is the best motivation.

However, one should not conclude that extrinsic motivation is of little value. Children need status and prestige; they need the praise of their teacher and peers coupled with all the ways this is applied. Hence, in addition to encouraging intrinsic motivation for learning, it is also necessary to foster ego-advancement motivation for academic achievement.¹

¹Ibid., p. 5.

CHAPTER III

THEORETICAL PROCESSES

Rationality in the sense of an appeal to a universal and impersonal standard of truth is of supreme importance.

...Bertrand Russell

CHAPTER III

THEORETICAL PROCESSES

What is the role of the educator in this process? Is it to understand the plight of these children and evolve programs that will help them "adjust" to their environment? Or can we make it possible for these youngsters, through schooling, to escape their environment - to move through the wall - and join the educated?

Perhaps it is time for educators to shed their "social work approach" and function in the technology of pedagogy, always aware, however, of the child's cultural handicaps.¹

THEORY I

Innate ability plus opportunity to learn = Performance

Among the disadvantaged is a type of learner of limited genetic endowment (innate ability), whom the best of instruction would profit in only limited ways. Many disadvantaged children are slow learners in a different sense. Their progress can be much more rapid with appropriate techniques of instruction. (Opportunity to learn).

A study of Revoire (Jensen, 1963) demonstrates the differential capacities of two groups of children with low IQ's, one white and one Mexican. The latter group profited from the introduction of verbal materials in their learning; the former group did not. This suggests that under the proper circumstances the introduction of verbal techniques of instruction may foster rapid learning (raise performance) with some disadvantaged children, whereas they might not with children who are slow learners because of mental retardation.²

¹Joseph O. Loretan, Shelley Umans, Teaching the Disadvantaged (New York: Columbia University Teachers College Press, 1966), p.2.

²Harry Beilin, Lassar G. Gotkin, Education of the Disadvantaged (New York: Rinehart and Winston, Inc., 1967), p. 297.

THEORY II

When a motivated learner encounters a barrier in attempting to reach his goal, this causes anxiety (free floating fear.) He resorts to mechanisms of defense such as aggression or regression which then causes a learning maladjustment.

Children in general, and disadvantaged children in particular, gain understanding when concepts are developed through their own experiences with concrete learning materials. (motivated learner.) School failure and loss of confidence resulting from an inappropriate curriculum depresses the culturally deprived child's motivation to learn and thereby increases the existing learning and intellectual deficit. (encounters barrier.) His approach to learning is first through things he can see, hear, feel and otherwise experience in as direct a way as possible - in other words, through sensory experience of all kinds. The disadvantaged child tends to be one interested in the "here" and "now" rather than in the distant past or equally remote future. (goal.) Radio and television are constant companions of many of these youngsters in their pre-school years. The environment in which they live is visually and aurally alive with sights and sounds stimulating to the senses. It should come as no surprise when these children find an almost uninterrupted stream of workbook assignments and printed verbal material any more than drudgery. (learning maladjustment.)¹

¹John Morlan, "Multisensory Learning," Teaching the Disadvantaged Child, ed., Sidney W. Tiedt, (New York: Oxford University Press, 1968). p. 20.

THEORY III

Transitions and Translations: The disparities between children become greater as the middle-class child acquires greater competence in the symbolic realm, while the lower-class youngster continues to struggle with concrete materials.

The principal task for work with disadvantaged children is to facilitate the transition from one level of thinking to the next through the development of special instructional techniques and material. (i.e., learning the equivalence of a concept represented visually and verbally.)

Montessori methods have been built, in large measure, on the notion of translation from sensory experience to the symbolic. It should be recalled that Montessori did not begin her work with the middle-class children who typically attend Montessori type schools now, but with "street urchins" in the San Lorenzo slum section of Rome. The basic techniques for which she became known were developed with them. As instructors who use these and similar materials recognize, once facility is developed in use of the formal language system, the manipulation of the concrete materials may and should be set aside.¹

The most important consequence of the culturally deprived child's slower and less complete transition from concrete to abstract modes of thought and understanding is his language retardation.²

¹Harry Beilin, Lassar G. Gotkin, "Transitions and Translations" Education for the Disadvantaged, ed., A. Harry Passow, (New York: Holt, Rinehart and Winston, Inc., 1967), p. 295

²David P. Ausubel, "Causes and Consequences of Language Retardation," Education for the Disadvantaged, (New York: Holt, Rinehart and Winston, Inc., 1967), p. 315.

CHAPTER IV

VERBAL DESTITUTION

Perhaps of all the creations of man,
language is the most astonishing.

...Giles Lytton Strachey

CHAPTER IV
VERBAL DESTITUTION

It is in the area of language development, and particularly with respect to the abstract dimension of verbal functioning that the disadvantaged child manifests the greatest degree of intellectual retardation.

The culturally deprived child is not spoken to or read to very much by adults. Hence his auditory discrimination tends to be poor and he receives little corrective feedback regarding his enunciation, pronunciation, and grammar.¹

In the cognitive style of the disadvantaged family, Bernstein (1960) points out, language is used in a convergent or restrictive fashion rather than a divergent, elaborative fashion. An exclamation or an imperative or a partial sentence frequently replaces a complete sentence or an explanation: if a child asks for something, the response is too frequently "yes," "no," "go away," "later," or simply a nod.²

We must also be aware that children often speak dialects different from that of the teacher, who usually, in her role as a model, speaks a standard English dialect. Too many of us operate on the notion that if individuals differ from us they are automatically wrong or inferior. Dialects should be regarded as different ways of speaking.³

¹Ibid., p. 314.

²Martin Deutsch, "The Role of Social Class in Language Development and Cognition," ed., A. Harry Passow, Education of the Disadvantaged. (New York; Holt, Rinehart and Winston, Inc., 1967), p. 215.

³Sidney W. Tiedt, Teaching the Disadvantaged Child, (New York Oxford University Press, 1968), p. 44.

In mathematics, vocabulary is important. The language of arithmetic and everyday language are similar in many respects; both employ statements that are made up of parts, that imply questions, etc. It follows, therefore, that the child who is relatively weak in the ability to handle everyday language statements will also be relatively weak in the ability to handle the language of arithmetic.

The culturally deprived child will have trouble repeating the statements to an operation; he will have trouble with the questions that are implied by statements. In other words, he will have trouble with the entire system. It may take him several weeks to repeat a seemingly simple statement like "Three plus two equals five," weeks to learn the answer to the question "What's another way of saying 'Three plus two?...Two plus three,'" and perhaps months to remember a simple addition fact such as $2 + 2 = 4$. He may be apparently unable to hear the parts in a question such as "Three plus zero equals how many?" And he may vacillate for months between an accurate information-processing language and wild guesses.

However, the culturally deprived child can be expected, after a slow start, to progress more rapidly in basic arithmetic operations than he does in language or reading.¹

¹Carl Bereiter, Siegfried Engleman, Teaching Disadvantaged in the Preschool, (New Jersey: Prentice-Hall, Inc., 1966), p. 231.

CHAPTER V

MATHEMATICAL OPERATIONS

As all that enters the human understanding comes through the senses, the first reason of man is a sensuous reason; and it is this which serves as a basis for intellectual reason.

...Rousseau

CHAPTER V

MATHEMATICAL OPERATIONS

To know an object or event, according to Piaget, is not simply to look at it or hear about it and make a mental copy or image of it. Knowledge is not a copy of reality. To know an object is to act of it, to modify it or transform it, and, in the process, to understand the way the object is constructed. Such an act is called an operation. An operation is the essence of knowledge. It is an interiorized (mental) action that modifies the object. As such it is a psychological operation.¹

The work of Piaget suggests those experiences that enhance knowledge (intellectual growth) are distinguished grossly in three stages:

STAGE I

In the pre-operational stage, (pre-school) the child's mental growth consists mainly in establishing relationships between experience and action. In this stage the child's perception of objects is paramount, and often only one aspect is considered and all others ignored. If the same amount of liquid is poured into two similar bottles and then the liquid from one is poured into a tall thin bottle, the child will concentrate on height only and say there is more in the tall bottle.

Also at this stage the child may have the idea of conservation of one object but does not yet understand the conservation of a collection of objects.²

¹Richard W. Copeland, How Children Learn Mathematics, (New York: Macmillian Publishing Col, Inc., 1974), p. 35.

²Sidney W. Tiedt, Teaching the Disadvantaged Child, (New York Oxford University Press, 1968), p. 167.

For example, when a set of hats is placed on the heads of a set of children in one-to-one correspondence, the child believes there are the same number of hats and heads. However, when the hats are removed and placed close together on a table and the children spread about, he will say there are more children than hats. Why? Because being spread out, the children look like more.

The most elementary forms of reasoning - whether logical, arithmetical, geometrical, or physical - rest on the principle of invariance of quantities; that the whole remains, whatever the arrangement of its parts, the change of its form, or its displacement in space and time. To the young child, numerical wholes, spatial dimensions, and physical quantities do not seem constant but to dilate or contract as they are operated upon. The total number of beads in a box remain the same whether subdivided into two, three, to ten piles. It is this that is so hard for the child to understand.

STAGE II

The concrete operations stage is identified by Piaget as the stage usually associated with the early school years. In this stage the child is not only active, as in the previous stage, but operational. He manipulates physical objects to represent things and relations in his mind. He uses data from his real world experiences, organizes them in his mind, and uses the data for solution of problems. In this manner cognitive growth is linked with concrete objects.¹

In performing concrete operations the child deals directly with objects and learns to make classifications and seriations. Concepts of substance, weight, and volume are obtained in this stage. The child structures the immediate

¹Ibid., p. 168.

world. To ascertain the constancy of the volume of a clay ball, the child drops it in the water. Is the level of the water the same as when the clay was previously immersed? The child's mind operates on the problem as he manipulates the real world's (concrete) objects.

STAGE III

Formal Operations: A child's progress into abstraction is furthered as he anticipates (mentally) that which is not present. Piaget observes the child moves to this stage at about age 11-12. Here the child becomes capable of reasoning not only with objects and actions but with abstractions. The child uses mental data by means of symbols. Thought goes beyond the immediate real world. Formulating hypotheses and deducing all the consequences from them become part of the cognitive power of the child. Possible variables and their relationships are explored. In this manner his problem-solving activities are forwarded by the power of abstract exploration.¹

Because of the age group involved in this field study, the writer has concentrated on the two basic stages of a child's ability to think logically; the concrete operations period, from approximately seven to eleven or twelve years of age, followed by the formal operations period.

¹Ibid., p. 169.

The basic difference in the two periods (stages) is that in the concrete operations stage children's logical thinking must be based on actions performed on objects or things (concrete), while at the formal operations level children can reason at the abstract or hypothetical level using symbols and not requiring physical experiences.

What has this to do with teaching mathematics in the public school classroom? Piaget has outlined a scheme of developmental patterns of intelligence. When aligned with developmental structures of mathematics, the teacher can, in turn, select and teach basic ideas; and do this in such a way as to pass from active exploration of concrete object, to formal operation in the abstract for the same basic idea. The environment of the advantaged as well as the disadvantaged child can be manipulated to follow, even force, the natural development of cognitive skills.¹

¹Ibid., p. 169.

CHAPTER VI

MATHEMATICAL LABORATORY

But what at all costs we ought to avoid, is the pointless accumulation of details. As many examples as you like; let the children work at them for terms, or for years. But these examples should be direct illustrations of the main ideas. In this way, and this only, can the fatal reconditeness be avoided.

...Alfred North Whitehead

CHAPTER VI
MATHEMATICS LABORATORY

The nature of the learning patterns of the disadvantaged child should provide clues as to the kind of mathematics programs which best enhance his progress. What kind of mathematics program is needed for this learner.

Children, even disadvantaged children, are concerned with the world about them. The mathematics teacher must build up the environmental experience so necessary for pre and beginning number experiences. The very young child uses his environment to recognize meanings and the words that express the meanings. By arranging the classroom into a "mathematics laboratory," it becomes a place where things can be counted, packed, grouped, rearranged, measured, joined, and partitioned. It is a room with books, puzzles, things to be stacked and sorted, weighing instruments and things to be weighed, and objects of many sizes, shapes and color to be used for sorting, building, pairing, and comparing.

A mathematics laboratory approach implies a teacher who encourages exploration and manipulation by children. "Working" noise is to be expected. Through exploration, children can pose questions and design work projects that lead to many number situations. Classroom activities of varied and of specific purpose should be incorporated. In this manner a broad readiness for further mathematical tasks can be set.¹

¹Allen C. Friebe, "Mathematical Experiences," Teaching the Disadvantaged Child, ed., Sidney W. Tiedt, (New York: Oxford University Press, 1968), p. 173.

In the concrete operations stage the child manipulates physical objects as he establishes relationships in his mind. Various "games" encourage mathematical readiness.

Concrete aids for discovering place-value principles begin with forming bundles of ten sticks from singles wherever possible and counting the bundles of ten. He learns that the number 13 can be represented by 1 bundle of ten in the ten's place and three objects in the one's place. Pocket charts, bead frames, multibase blocks, and the abacus are all concrete devices to penetrate into the meaning of place value. Once generalized, the concept of place value is central to understanding computation with whole numbers, fractional numbers, per cent, rounding in approximate computation, and other future uses.

The use of puzzles and other materials encourage the discrimination of shapes by young children. The puzzle is a primary tool for this purpose. Discrimination skills are developed as the child sorts, fits, and becomes aware of patterns. Basic geometric shapes such as triangles, squares, and rectangles can be built into a fraction game not intended to teach the child addition, subtraction or division of fractions, but to aid him in correlating perceptual discriminations with the language of arithmetic, an intricate part of mathematical readiness.¹

Readiness for experience with units of measure, value of money and other measurement can be set in the laboratory classroom environment. Simple experimental tasks begin with such activities as:

Draw round your open hand. Now rule a line from thumb tip to the tip of the little finger. This is your "span." Measure the various things in your classroom with your "span."

¹Ibid., p. 176.

Roll a die marked 1 through 6. Move the number of spaces rolled on a board marked 1 to 100 and collect pennies to be exchanged for a nickel, 2 nickels to be exchanged for a dime, 2 dimes and one nickel to be exchanged for a quarter, 2 quarters to be exchanged for fifty-cents and 2 fifty-cents to be exchanged for one dollar. Actual manipulation and exchanging coin value takes place as the child moves forward after each roll of the die.

The teacher in the laboratory classroom establishes routines and situations to enhance development of time concepts. "Today," "now," "tomorrow," "yesterday," "later," "it takes time," - all are concepts that may not exist for a child from a household in which communication between adult and child is absent. Abstract ideas of time are extended as an awareness of clocks, watches and instruments are made a part of the environment of the child. The developing mind of the child in a rich environment moves ahead in further time relationships as he understands day, hour, minute and second.¹

Clock game:

Pick a card on which is written 4,5,8,9,10,15 (or any number through 60) minutes. Move large hand (minute hand) that number of digits. Each sixty minutes move the small hand (hour hand) to the next hour. Twenty-four revolutions around the clock (24 hours) equals one day.

Calendar game:

Calendar bingo leads the child into the concept of day, week, month and year.

The concept of space and position are not easily perceived by the disadvantaged child. As the child physically moves about the geographic area of the room, locations and regions of movement, direction, and distance concept formation are facilitated. This should be expanded by relating to the playground and the neighborhood. As the child progresses, his awareness

¹Ibid., 174.

of relative position of objects other than self will sequence toward abstract concepts of space.

"Discovery," "understanding," "individualizing" are labels every good mathematics program should bear. These labels appear more readily as children begin to see the world of mathematics as surprises, patterns, and fascinating games.¹

To enjoy the subject for its own sake; to want to make the leap to the next part of the puzzle; to want to supply the next piece of the pattern; to experience enjoyment and excitement in mathematics - all these give rise to intrinsic motivation for the learning of the subject. It is with this power that the disadvantaged youth may well go farthest into the realm of quantitative conceptual development. Here lies power that every teacher of mathematics must tap.

For example, this activity becomes more interesting when varied patterns are used. Instead of: $\begin{array}{c} 2 \\ +6 \end{array}$ the horizontal form can be given: $2+6=\underline{\quad}$, $2+\underline{\quad}=8$, $\underline{\quad}+6=8$. If necessary illustrate with set objects. Then pose the question, "Can other possible forms or arrangements be found? Some one might suggest: "Add and place sums in the boxes as follows:

$$\begin{array}{|c|c|c|c|} \hline 8 & 2 & 6 & 8 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|c|} \hline 8 & 6 & 2 & 8 \\ \hline \end{array}$$

The next step is to extend the diagrams to provide further boxes to be filled:

$$\begin{array}{|c|c|c|c|} \hline 8 & 2 & 6 & 8 \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline 6 \\ \hline 2 \\ \hline 4 \\ \hline 8 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|c|} \hline 9 & 4 & 5 & 9 \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline 11 \\ \hline 6 \\ \hline 5 \\ \hline 11 \\ \hline \end{array}$$

Now let us consolidate the diagrams and get another set of spaces to be completed:

¹Ibid., p. 174.

	6	11	
8	2	6	8
9	4	5	9
	6	11	

But the student will ask, "What about the corners?"

What does go in the corners?¹

7	6	11	10
8	2	6	8
9	4	5	9
10	6	11	7

You will notice that we have taken the basic twelve addition facts we began with and explored possible patterns and variations. In this manner the children's curiosity can be aroused and the search for the extension undertaken. They are intrinsically motivated.

In addition to the twelve basic addition facts more mathematics enters. Obviously, we have changed the order of the addends without changing the sum. We are exploring the commutative property for addition. We might ask the children if they see any similarities or differences in the sums. Perhaps some will notice the top and bottom middle pairs (6,11) are alike as are the left and right middle pairs (8,9). What is the sum of each of these pairs? (17) Will this always work? Is it like the sum of any other numbers? Examine the sum of the beginning four numbers. Aha! They also produce the same sum:

$$2 + 6 + 4 + 5 = 17.$$

Are there any other patterns? When we add sums in the top row do they equal the sums in the bottom row? Left column and right column! Try it.²

¹Ibid., p. 182.

²Ibid., p. 184.

Now extend the basic example. Challenge the students to try other basic sets in the central four boxes. Does it always lead to the same conclusion? Will the pairs be the same? Encourage children to try bigger numbers. Does it work for zero? Fractions? What must be true of the center boxes to make all four corners alike? What happens when we place numbers in sequence in the four central boxes? In this manner the fascination of the structure of the topic can be most productive.

Many materials of the so-called "modern mathematics" lend themselves to discovery experiences. Magic squares, chain reaction patterns, cross number puzzles, numberline line work, computing shortcuts, algorism variations - such as addition by casting out nines or multiplying by doubling-algebraic patterns, continuous sums problems, logical proof teasers, and geometric representations of number can be utilized by the inventive teacher to challenge individually children of differing ability.

But a teacher need not consider this the extent of possible self-motivating activities. Take the ordinary algorism for computing and change it so as to intrigue the child. The following show how one's ingenuity can be extended:

1. Find all possible pairs to give 12 as a product.
2. Count in sequence, renaming each number using only 2's.

$$1 = 2 \div 2, 2 = 2, 3 = 2 + (2 \div 2), 4 = 2 \times 2$$

3. Find the pattern: 1,2,5,2,4,10, 4,8,20, 8,16,40 etc.¹
4. Fill the tables:

2	6
4	12
6	18
☐	☐
☐	☐

2,3	6
4,1	4
10,2	20
5,6	☐
☐ ,7	21

¹Ibid., p. 185.

5. Reconstruct these problems.

$$\begin{array}{r} \begin{array}{r} 72 \\ \times 5 \\ \hline 360 \\ 144 \\ \hline 0000 \end{array} \qquad \begin{array}{r} 3 \square \\ - 19 \\ \hline \square 4 \end{array} \end{array}$$

The variety is endless. Exciting material as introductions to the conceptual world of mathematics leads to discussions, arguments, hunches, and to proofs. Here the child is doing mathematics and gaining insights into the structure of the discipline.¹

¹Allen C. Friebe, "Mathematical Experience," Teaching the Disadvantaged ed., Sidney W. Tiedt, (New York: Oxford University Press, 1968), p. 185.

CONCLUSION

The teacher of the disadvantaged must possess values that will inspire these children to improve their culture, education, morality, and social and economic usefulness. This can best be done if the teacher sees himself in a helping and sharing role rather than in the role of doing something to people.

The teacher of deprived children cannot use gimmicks or tricks. Instead, he should be consistent in his actions, giving the children someone on whom they can depend. He should be straight-forward and never sarcastic or cynical. He should be informal, warm, down-to-earth. He should remember that culturally deprived children desire physical warmth, remembering that it is not necessarily true that they like intense affection.

This teacher should be competent in theoretical skills, efficient in remedial procedures and in group and individual techniques. He should be able to control aggression and violence, recognize symptoms of physical, social and emotional inadequacies, and make proper referrals.

It is especially important that this teacher have a knowledge of the community language pattern and make effective use of this knowledge until the child is able to make a transition from his informal style to more academic language.

Without the teacher who cares, shows a humanistic approach, is understanding and willing to help, there is little hope for the disadvantaged child.

PROJECTIONS

Passow calls for:

an educational program which will insure meaningful growth, provide a sense of attainment and accomplishment, help youngsters understand and face their limitations as well as their strengths, provide for healthy attitudes toward school and society, and generally turn the indifference or antagonism of the disadvantaged child into acceptance and understanding.

A number of programs have been initiated to train competent teachers, improve education and educational opportunities as well as supportive programs based on preserving the dignity of a culture identified as distinctive for reasons of their estrangement from the rest of the country.

Train Competent Teachers: West Virginia University College of Arts and Sciences is offering a major in Appalachian studies for the first time.

The program, designed to allow students the opportunity to understand the problems and culture of the Appalachian region, was organized this academic year from courses already taught at WVU.

Any student in the WVU-College of Arts and Sciences is eligible to apply for admission to the program by arranging a schedule to include Appalachian Studies courses.

Appalachian Studies is one of the newly developed degree programs in the WVU College of Arts and Sciences involving concentrated study in more than one department.¹

These programs, which lead to the Bachelor of Arts degree, include the individualized major program, the specially designated area programs (Appalachian Studies) and the liberal arts major.

¹James Welch, Appalachian Studies Subcommittee, (Morgantown: West Virginia University College of Arts and Sciences 1976.)

Education and Educational Opportunities: Appalachia Educational Laboratory, Inc., (AEL) has a specific mission; improvement of education and of educational opportunity in the Appalachian Region of seven states - Alabama, Kentucky, Tennessee, Ohio, Pennsylvania, Virginia and West Virginia. These states participate directly in the operation of the Laboratory through the AEL Board of Directors. The 38 member Board, which governs AEL, is made up of state leaders from education, labor, business and industry from these seven participating states. The Laboratory is a private, nonprofit corporation with headquarters in Charleston, W. Va.

AEL staff has multiple expertise allowing them to perform capably in each of nine Research and Development divisions:

1. Career Guidance and Counseling
2. Diffusion and Marketing
3. Early Childhood
4. Educational Organization and Administration
5. Experiential Education
6. Research and Evaluation
7. Special Education
8. Special Projects
9. Vocational and Technical Education.¹

Because of the writer's Early Childhood Educational background, I found the AEL's Early Childhood Division's educational program to be of special interest:

Rural Appalachian children may lack a lot of things at home, but most of them do have a television set and their parents, so, in 1967, when the AEL decided to design an educational program for rural three, four, and five year olds, it built on what was there - television and parents. The result was Home-Oriented Preschool Education (HOPE.)

¹E. Dale Doak, Appalachia Educational Laboratory, Inc., (Charleston: Division of Research and Evaluation, 1971.)

HOPE recognizes the parents' importance in those crucial early years, and gives the parents some help with their job. Help comes in four ways:

1. a daily television lesson.
2. a weekly visit to the home by paraprofessionals who work with parents to aid them in teaching the child, and who deliver materials to go with the next week's T-V lessons.
3. a weekly group session for children staffed by trained teachers - utilizing a mobile classroom.
4. regular group sessions for parents to allow them to explore further the responsibilities and opportunities of parenting.

A survey of a representative sample of Appalachian preschoolers shows "a picture of cultural diversity rather than uniform cognitive, intellectual deficits...deficits tend to center upon verbal tasks of those problem settings which demand symbolic representation." Taking into account the findings of this assessment, a curriculum was designed and the production of TV lessons and related home classroom materials was begun.¹

Evaluation of the results of three years of field testing showed that HOPE was an effective, relatively low cost means of providing rural Appalachian children with a running start on school.²

Supportive Programs: The program of the Pioneer Crafts Council has been sponsored by a grant from the Commonwealth of Pennsylvania Council on the Arts and the National Endowment for the Arts in Washington, D.C., a federal agency created by act of Congress in 1965. Other aid comes from the H. M. Bitner Charitable Trust, the Roy Hunt Foundation, the McFeely-Rogers Foundation, and by contributions from local government and individuals.

The goal of the PCC is to re-new and keep alive the craft skills of the Appalachian Region culture. PCC is in its fifth year of progress. The 1980 summer series of craft workshops at Mill Run, Pennsylvania will offer creative experiences in: Ceramics-earth made useful; Wood-beauty from the forest; Textiles-strength of fiber; Metal-awareness of natural minerals; Instrument

¹Ibid.

²Ibid.

Making-joy of music; and Printmaking-capturing natural materials.

The Pioneer Crafts Council believes that a craft as an art form has the obligation to communicate, and that every person is capable of creating something beautiful and useful.¹

By pioneering in new methods and techniques of reviving inherent crafts the PCC seeks to foster a lasting respect for a fading culture.²

The challenge of today's educator is to create schools that are capable of developing the natural abilities for learning that children bring to the classroom.

The challenge to teachers in this vital effort is urgent - the rewards immeasurable!

¹Bernadine Hagan, Pioneer Crafts Council, ed.dir., Diane Vargo (2113 Murray Avenue, Pittsburgh, Pennsylvania, 1976)

²Ibid.

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